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| APPLICATION NO. | FILING DATE | FIRST NAMED INVENTOR | ATTORNEY DOCKET NO. | CONFIRMATION NO. |
|---|-------------|----------------------|----------------------------|------------------|
| 10/018,303 | 10/30/2001 | Osamu Sakai | 10059-400US (P23013-01) | 4864 |
| 570 | 7590 | 04/12/2004 | EXAMINER | |
| AKIN GUMP STRAUSS HAUER & FELD L.L.P. ONE COMMERCE SQUARE 2005 MARKET STREET, SUITE 2200 PHILADELPHIA, PA 19103-7013 | | | ALEJANDRO, RAYMOND | |
| | | | ART UNIT | PAPER NUMBER |
| | | | 1745 | |

DATE MAILED: 04/12/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

| | | | |
|------------------------------|------------------------|---------------------|--|
| Office Action Summary | Application No. | Applicant(s) | |
| | 10/018,303 | SAKAI ET AL. | |
| | Examiner | Art Unit | |
| | Raymond Alejandro | 1745 | |

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 09 February 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 and 6 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 and 6 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 10/30/01 & 11/10/03 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
 Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
 Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application (PTO-152) |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date <u>10/30/01</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

This communication is responsive to the amendment filed 02/09/04. Prosecution on the merits of this application is reopened on claims 1-4 and 6 considered unpatentable for the reasons indicated below: the indicated allowability of the above-mentioned claims is withdrawn in view of the newly discovered reference(s) as seen below. Rejections based on the newly cited reference(s) follow and for the reasons of record:

Election/Restrictions

1. Applicant's cancellation of claim 5 in Paper No. 02/09/04 is acknowledged.

Priority

2. Acknowledgment is made of applicant's claim for foreign priority under 35 U.S.C. 119(a)-(d). Receipt is acknowledged of papers submitted under 35 U.S.C. 119(a)-(d), which papers have been placed of record in the file.

Information Disclosure Statement

3. The information disclosure statement (IDS) submitted on 10/30/01 was considered by the examiner.

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Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-3 and 6 are rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al 6190793 in view of Mattejat et al 5472801.

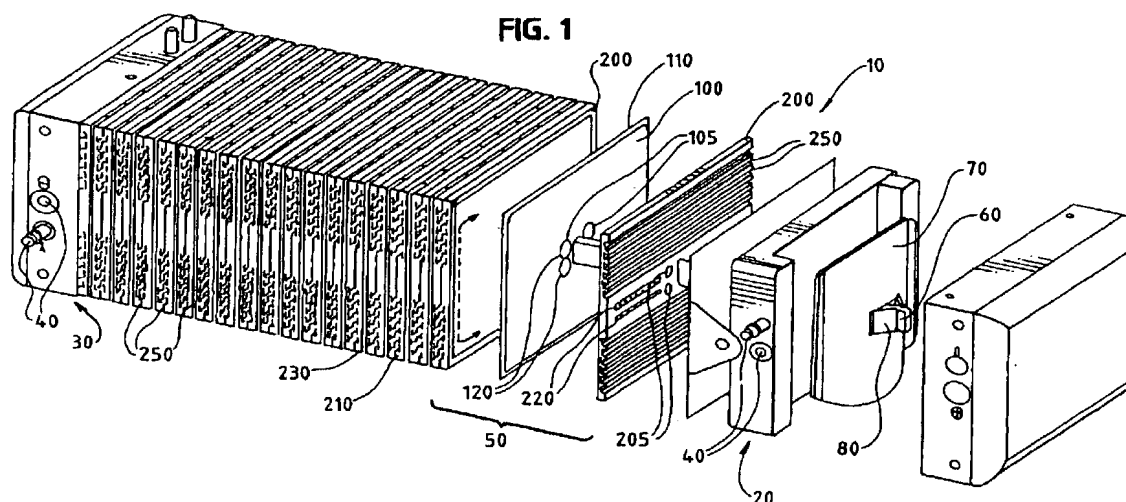
The present claims are directed to a fuel cell wherein the disclosed inventive concept comprises the specific retaining plate forming gap to retain and compress the fuel cell units. Other limitations include the specific retaining plate and separator configuration; and the voltage measurement features

With respect to claims 1-3 and 6:

Barton et al disclose an electrochemical fuel cell stack with an improved compression assembly (TITLE). Figure 1 illustrates a solid polymer electrochemical fuel cell stack 10 including a pair of end plate assemblies 20 and 30, and a plurality of stacked fuel cell assemblies

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50, each comprising an MEA 100, and a pair of flow field plates 200 (*the flow field plates are also known in the art as separators*) (COL 7, lines 64-67). As illustrated in Figure 1, each MEA 100 is positioned between the active surfaces of two flow field plates 200. Each flow field plate 200 has flow field channels 210 on the active surface thereof (which contacts the MEA) for distributing fuel or oxidant fluid streams to the active area of the MEA 100 (COL 8, lines 23-33). In the illustrated embodiment, flow field plates 200 have a plurality of open-faced parallel channels 250 formed in the non-active surface thereof (COL 8, lines 34-39).



Barton et al also disclose that solid polymer electrochemical fuel cells generally employ a membrane electrode assembly (MEA) consisting of a solid polymer electrolyte membrane disposed between two electrodes layers (COL 1, lines 20-26). In typical fuel cells, the MEA is disposed between two electrically conductive separator plates or fluid flow field plates (COL 1, lines 31-39). Fluid flow field plates have at least one flow passage formed therein to direct the fuel and oxidant fluid streams to the respective electrode layers, namely the anode on the fuel side and the cathode on the oxidant side. In a single cell arrangement, fluid flow field plates are provided on each of the anode and cathode sides (COL 1, lines 31-39). It is further disclosed that

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two or more fuel cells can be connected together to increase the overall power output of the assembly. In series arrangements, one side of a given plate serve as an anode plate for one cell and the other side of the plate can serve as the cathode plate for the adjacent cell, such a series of connected multiple fuel cell arrangement is referred to as a fuel cell stack (COL 1, lines 40-47).

It is disclosed that an elongate tension member extends between and through the end plate assemblies 20 and 30 to retain and secure stack 10 in its assembled state. It is further disclosed that spring plate 70 along with end plates 20 apply a compressive force to fuel cell assemblies 50 of stack 10 and act as restraining members (COL 8, lines 1-7). *It is apparent from Figure 1 above that the end plate assemblies 20, 30 form a gap therebetween so as to accommodate the fuel cell units in a sandwiched arrangement (that is, the end plate assemblies are spaced apart so as to dispose between the two of them the fuel cell units).*

It is also apparent from Figure 1 above that a laminated and compressed configuration is formed when all components of the solid polymer fuel cell stack with a compression assembly comprising the tension member and a spring plate acting as a unitary resilient restraining member are put together. That is, they all become united into a single unit by compression means and/or a single unit is made by uniting or holding together superposed layers of the MEA, the separator (fluid flow field plate) and the end plates.

Barton et al further disclose that corrective action for electrocatalyst poisoning typically requires the fuel cell to be shut down. For electrocatalyst which is severely poisoned, it may be necessary to dismantle the fuel cell stack and replace the MEAs and the components which caused the contamination (COL 3, lines 15-20). Accordingly, there is a need for an improved compression assembly which mitigates some or all of the aforementioned disadvantages which

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are associated with conventional compression assemblies which employ conductive tension members (COL 3, lines 29-33). *Thus, Barton et al' teaching clearly envision that one of the advantage to use his fuel cell stack with an improved compression assembly is to be able to replace MEAs (membrane electrode assemblies or fuel cell units) which become poisoned. That is, replacing MEAs requires removing the poisoned MEA and re-installing a new MEA.*

Barton et al disclose a fuel cell assembly according to the foregoing aspects. However, Barton et al do not expressly disclose the specific hollow plate structure.

Mattejat et al disclose an electrolyte electrode unit as shown in Figures 4-6 having a functional unit into which a contact plate 77, a plate of carbon paper, an anode 80, a polymer electrolyte membrane (PEM) 82, a cathode 84, a further plate of carbon paper, and a further contact plate 77 are installed in succession (COL 6, lines 5-11). This forms a stack configuration of plate-like components (COL 2, lines 34-37). It is further disclosed formation of a fuel cell block (COL 1, lines 7-12/ COL 2, lines 13-30) comprising two mutually parallel plates having inner surfaces facing toward each other and outer surfaces facing away from each other; generally flat components resting on both sides of the outer surfaces of the plates in the apparatus and defining a first chamber with one of the outer surfaces at two sides of the component; the inner surfaces of the plates enclosing a third gas tight chamber therebetween; an arbitrary antechamber; and at least one gas tight channel extending between the plates in the plane of the plates (COL 2, lines 15-30).

Figures 4-5 below illustrate the laminated fuel cell stack arrangement:

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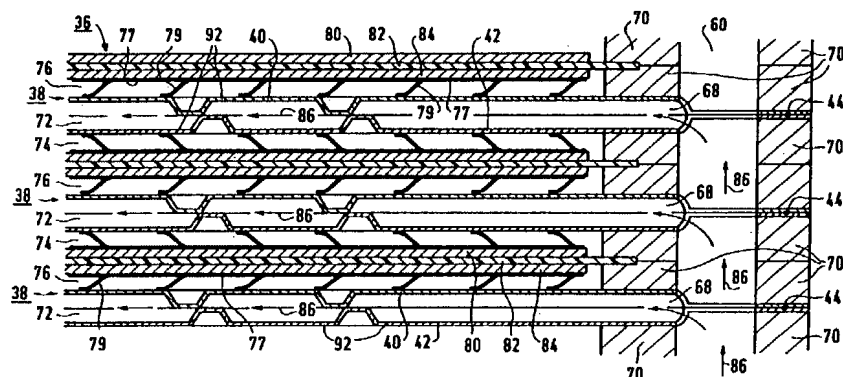


FIG 4

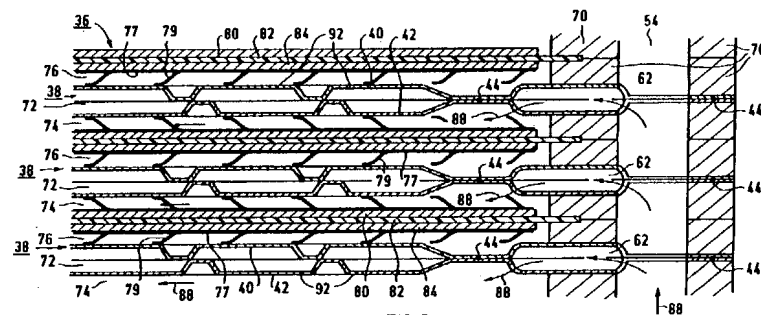


FIG 5

Mattejat et al further disclose the use of a component 38 which includes two plates 40, 42 disposed parallel to one another; the plates 40, 42 are joined to one another by means of a gas tight seam. The plates are constructed in such a way that protuberances of the plates 40, 42 rest against the axial flow line (COL 5, lines 34-47). It is further disclosed that coolant 86 flowing in through the axial channel or the antechamber 60 flows through an inlet end of the channels 68, through the channels 38, out of discharge end of the channels 68, into chambers 72 that are enclosed in gas tight and water tight fashion (COL 6, lines 62-67).

It is also disclosed that in order to space apart the plates 40, 42, it is possible as an alternative to hemispherical protuberances, to provide half-round groove-like protuberances or frustoconical protuberances 92 in the plates 40, 42, having structures which are staggered with respect to one another. The hemispherical or half round groove like or frustoconical protuberance

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92 then define the volume and structure of the chamber enclosed by the plates 72 (COL 7, lines 40-48). *Hence, it is asserted that these protuberances somehow impart an undulate cross-section in the hollow space separating one plate from another. It is also contended that the structure of the disclosed fuel cell is substantially equivalent to the structural configuration of the present claims (i.e. two plates forming a hollow section and able to form a gap therebetween).*

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the specific hollow plate structure of Mattejat et al'801 in the fuel cell assembly of Barton et al'793 as Mattejat et al'801 disclose the use of hollow plate structure provides high operational reliability of the process control apparatus in the course of supplying and removing liquid or gaseous media. Accordingly, a plurality of axial channels are provided in the peripheral region of the stack configuration, and as a result, it is possible to provide the supply of various media to the various components of the process control apparatus, for instance, the fuel cell block. Furthermore, Mattejat et al also recognize that the hollow plate structured component can be installed in a process control apparatus which can be inserted into a fuel cell block. *Thus, Mattejat et al and Barton et al address the same problem of providing suitable fuel cell components which can be inserted into a fuel cell assembly for optimum performance thereof.*

7. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over Barton et al US 6190793 in view of Mattejat et al 5472801 as applied to claim 1 above, and further in view of Sawyer 4198597.

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Barton et al and Mattejat et al are applied, argued and incorporated herein for the reasons above. However, the preceding prior art does not expressly disclose the voltage measurement jig and the voltage display device.

Sawyer et al disclose a negative cell detector for a multi-cell fuel cell stack (TITLE). Sawyer et al disclose a detector for sensing defective cells among a plurality of producing cells forming a source of electrical power (ABSTRACT). The invention relates to a detector for sensing one or more negative cells in a multicelled module and more particularly, to a detector apparatus for continuously monitoring each voltage producing cell of a module in fuel cells to identify faulty or inoperative cells (col 1, lines 6-12).

A series of light emitting diodes are coupled to the positive and negative junction of each voltage producing cell so that they are biased to a nonconducting state so long as the cell has a positive output voltage (ABSTRACT). In the event that a cell becomes defective causing its voltage output to drop, the voltage produced by the remaining cells create a load current by which the defective cell goes negative and forward biases the corresponding light emitting diode. In turn, the light emitting diode changes to its conductive state whereupon it emits light and identifies the defective cell (ABSTRACT).

In view of the above, it would have been obvious to one skilled in the art at the time the invention was made to incorporate the voltage measurement jig and the voltage display device of Sawyer et al into the fuel cell system of both Barton et al and Mattejat et al as Sawyer et al discloses that such devices for detecting and displaying voltage are used for sensing defective cells among a plurality of voltage producing cells which together form a source of electrical power such as the fuel cell. Accordingly, the detector can be used to monitor cells whose voltage

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levels may be hundreds of volts above ground potential and yet is electrically isolated so that it does not create a safety hazard to the plant facilities or operating personnel. Further, the detector can be used to continuously monitor all the cells in a multi-celled power source to sense negative or non-voltage producing cells but it will only draw power when a particular cell is faulty. Moreover, the detector independently monitors each cell of a multicell power source for negative cells in a manner that any inherent voltage variation of the cells in the stack will not provide an erroneous fault indication. *Accordingly, this is necessary because a totally inoperative cell still connected thereto with the remaining cells of a multi-stacked fuel cell is a particular problem because, in addition, to having no output voltage, its internal impedance normally increases and actually causes a voltage drop across the cell during load conditions. The current forced through the faulty cell by the remaining cells of the stack causes power to be dissipated in the form of heat. This heat is conducted to cells adjacent to the bad cell and can create over-temperature conditions which will reduce the operating life of the adjacent cells.*

Allowable Subject Matter

8. The indicated allowability of claims 1-4 and 6 is withdrawn in view of the newly discovered reference(s) to Mattejat et al. Rejections based on the newly cited reference(s) has been set forth in the immediately preceding paragraphs.

Response to Arguments

9. Applicant's arguments with respect to claims 1-4 and 6 have been considered but are moot in view of the new ground(s) of rejection.

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Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Raymond Alejandro whose telephone number is (571) 272-1282. The examiner can normally be reached on Monday-Thursday (8:00 am - 6:30 pm).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Patrick J. Ryan can be reached on (571) 272-1292. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Raymond Alejandro
Examiner
Art Unit 1745

A handwritten signature in black ink, appearing to read 'RAM', with a long, sweeping horizontal stroke underneath.